

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

LG DISPLAY CO., LTD., :
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 Plaintiff, :
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 v. : Civil Action No. 06-726-JJF
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 AU OPTRONICS CORPORATION; :
 AU OPTRONICS CORPORATION :
 AMERICA; CHI MEI :
 OPTOELECTRONICS CORPORATION; :
 and CHI MEI OPTOELECTRONICS :
 USA, INC., :
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 Defendants. :
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AU OPTRONICS CORPORATION, :
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 Plaintiff, :
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 v. : Civil Action No. 07-357-JJF
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 LG DISPLAY CO., LTD. and :
 LG DISPLAY AMERICA, INC., :
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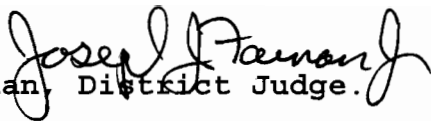
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O P I N I O N

April 30, 2010

Wilmington, Delaware.


Farnan, District Judge.

In the second phase of this patent infringement action, LG Display Co., Ltd. ("LGD") alleges infringement of four patents (collectively, the "LGD Patents") against AU Optronics Corporation ("AUO") and Chi Mei Optoelectronics Corporation ("CMO"): U.S. Patent No. 5,019,002 (claim 8); U.S. Patent No. 5,825,449 (claims 10 and 11); U.S. Patent No. 6,815,321 (claims 7, 17 and 19) and U.S. Patent No. 7,218,374 (claim 9).¹

The claims and counterclaims for infringement and declaratory judgment in this case arise under the patent laws of the United States, Title 35, United States Code. Accordingly, the Court has subject matter jurisdiction over this action pursuant to 28 U.S.C. §§ 1331, 1338(a), and 2201(a). Personal jurisdiction over the parties exists pursuant to 10 Del. C. § 3104, the Delaware long-arm statute. D.I. 1170 at 12. Likewise, venue in this district is appropriate under 28 U.S.C. §§ 1391(b), (c) and (d) and 1400. Neither jurisdiction nor venue is contested by the parties.

This Opinion constitutes the Court's findings of fact and conclusions of law on the claims brought by the parties.

¹ AUO and CMO brought separate infringement actions against LG Display Co. Ltd. and LG Display America, Inc. concerning patents owned by AUO and CMO. Proceedings with respect to CMO have been stayed, and the Court has already adjudicated the issues raised in the Phase I bench trial concerning the patents asserted by AUO against LGD.

BACKGROUND

The background relevant to this action has been set forth fully by the Court in its previous Opinion concerning the issues raised in Phase I of the trial related to AUO's asserted patents. Like AUO's asserted patents, the patents asserted by LGD all relate to liquid crystal display ("LCD") products or methods of producing and assembling such products. Id., Stipulated Fact No. 13. An LCD is a flat panel display device that is used to generate images in a variety of products, including such devices as computer monitors, television screens, notebook computers and mobile phones. Id., Stipulated Fact No. 14.

DISCUSSION

I. Claim Construction

A. The Legal Principles of Claim Construction

Claim construction is a question of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 977-78 (Fed. Cir. 1995), aff'd, 517 U.S. 370, 388-90 (1996). When construing the claims of a patent, a court considers the literal language of the claim, the patent specification and the prosecution history. Markman, 52 F.3d at 979. Of these sources, the specification is "always highly relevant to the claim construction analysis. Usually it is dispositive; it is the single best guide to the meaning of a disputed term." Phillips v. AWH Corporation, 415 F.3d 1303, 1312-17 (Fed. Cir. 2005) (citing Vitronics Corp. v. Conceptronic,

Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996)). However, "[e]ven when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using 'words or expressions of manifest exclusion or restriction.'" Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 906 (Fed. Cir. 2004) (quoting Teleflex, Inc. v. Ficosa N. Am. Corp., 299 F.3d 1313, 1327 (Fed. Cir. 2002)).

A court may consider extrinsic evidence, including expert and inventor testimony, dictionaries, and learned treatises, in order to assist it in understanding the underlying technology, the meaning of terms to one skilled in the art and how the invention works. Phillips, 415 F.3d at 1318-19; Markman, 52 F.3d at 979-80. However, extrinsic evidence is considered less reliable and less useful in claim construction than the patent and its prosecution history. Phillips, 415 F.3d at 1318-19 (discussing "flaws" inherent in extrinsic evidence and noting that extrinsic evidence "is unlikely to result in a reliable interpretation of a patent claim scope unless considered in the context of intrinsic evidence").

In addition to these fundamental claim construction principles, a court should also interpret the language in a claim by applying the ordinary and accustomed meaning of the words in the claim. Envirotech Corp. v. Al George, Inc., 730 F.2d 753,

759 (Fed. Cir. 1984). If the patent inventor clearly supplies a different meaning, however, then the claim should be interpreted according to the meaning supplied by the inventor. Markman, 52 F.3d at 980 (noting that patentee is free to be his own lexicographer, but emphasizing that any special definitions given to words must be clearly set forth in patent). If possible, claims should be construed to uphold validity. In re Yamamoto, 740 F.2d 1569, 1571 (Fed. Cir. 1984).

B. CMO's Motion For Leave To File A Memorandum In Response To LG Display's And AUO Optonics' Post-Trial Briefs Addressing Key Disputed Claim Constructions (D.I. 1434)

Before addressing the claim construction disputes raised by the parties, the Court must first address the Motion For Leave To File A Memorandum In Response To LG Display's And AUO Optonics' Post Trial Briefs Addressing Key Disputed Claim Constructions filed by CMO. Although this action has been stayed to the extent it involves CMO, CMO contends that the claim construction disputes concerning the LGD patents impact its defense of the suit brought by LGD against CMO. Therefore, CMO requests an opportunity to be heard on the claim construction issues. AUO does not oppose CMO's Motion, but LGD has filed an opposition.

LGD contends that CMO's Motion is improper because it was filed two days before the close of post-trial briefing, and CMO failed to meet and confer with LGD before its filing. LGD also contends that CMO participated in the claim construction

briefing, and therefore, additional briefing here, in the post-trial phase of LGD's claims against AUO, is unnecessary. According to LGD, CMO's briefing is unfair because it provides CMO with an opportunity to argue its infringement defenses prematurely. Because claim construction is a matter of law, LGD further contends that CMO incorrectly assumes that inconsistent results could occur between the AUO trial and the CMO trial. LGD also contends that CMO's Motion unfairly interjects information outside the trial record, including information that was excluded by the Court in the context of pretrial rulings on motions in limine, and therefore, LGD maintains that CMO's Motion is prejudicial to LGD.

At this juncture, the Court is not inclined to grant CMO leave to file a response to LGD and AUO's post-trial briefs. CMO has voiced its position regarding the claim construction of LGD's patents in the context of extensive claim construction briefing and the Markman hearing held in this case. To the extent CMO's positions are already on the record, the Court will consider them in rendering its claim construction decisions here; however, the Court will not permit CMO to interject itself into the post-trial briefing of LGD and AUO where proceedings against CMO have been stayed. Accordingly, the Court will deny CMO's Motion For Leave To File A Memorandum In Response To LG Display's And AUOptronics' Post Trial Briefs Addressing Key Disputed Claim

Construction.

C. LGD's Patents

The parties dispute a number of claim terms from the asserted patents. The Court has selected for construction those terms that appear most pertinent to the disputes and trial positions argued by the parties in the post-trial briefing.

1. U.S. Patent No. 5,019,002

LGD asserts claim 8 of the '002 patent. Claim 8 is a dependent claim that stems from claim 1. Accordingly, the relevant claims of the '002 patent are provided below, in full:

1. A method of manufacturing active matrix display backplanes and displays therefrom, comprising:
providing a substrate;

forming a pattern of pixels on said substrate;

forming a plurality of row and column intersecting pixel activation lines, interconnecting substantially all of said row lines to one another and substantially all of said column lines to one another;

forming an outer electrostatic discharge guard ring on said substrate coupled to said interconnected row and column lines via a resistance to provide protection from electrostatic discharges between said row and column activation lines during manufacture of the displays; and

removing said outer guard ring and row and column interconnections prior to completion of the display.
8. The method as defined in claim 1 including forming an inner electrostatic discharge guard ring on said substrate coupled to said row and column lines via shunt switching elements to provide protection from

electrostatic discharges between said row and column activation lines during manufacture of the displays and thereafter.

The parties agree that one of ordinary skill in the art with respect to the '002 patent at the time of its filing is a person with a bachelor's or advanced degree in engineering or a related field, and one or more years of experience associated with semiconductors or flat panel displays. Trial Tr. II 1521:3-12 (Schlam); D.I. 1425 at 78.

a. **"interconnecting substantially all . . ."**

LGD contends that the phrase "interconnecting substantially all of said row lines to one another and substantially all of said column lines to one another" as required by the '002 patent means "electrically connecting with conductive material all or nearly all row lines to at least one other row line and electrically connecting with conductive material all or nearly all of the column lines to at least one other column line." D.I. 376 at Exh. B-3. LGD contends that its construction is supported by the intrinsic record which shows either each row line interconnected to one other row line and each column line interconnected to one other column line, or serially connecting the row lines and column lines where each row or column line is interconnected on one end to one row or column line and is interconnected on the other end to another row or column line.

In response, AUO contends that this phrase should be construed as "joining almost all of the row lines together and joining almost all of the column lines together." Id. AUO contends that this construction is consistent with the plain meaning of the phrase, the teachings of the patent, and the claim construction the Court rendered in previous litigation concerning this patent. AUO also contends that LGD's claim construction reads out the word "substantially" from the claim and attempts to broaden the claim to include semiconductor material as conductive material.

CMO contends that this phrase should be construed as "electrically connecting with conductors nearly all, but not all, of said row lines to one another and nearly all, but not all, of said column lines to one another." Id. CMO contends that this construction is consistent with the Court's previous construction, and LGD should not be permitted to reargue a claim construction it already argued in previous litigation.

As AUO and CMO note, the Court construed at least part of this phrase in previous litigation involving the '002 patent. In LG Phillips LCD Co., Ltd. v. Tatung Co., the Court construed the term "interconnecting" to mean "electrically connecting with conductors." 434 F. Supp. 2d 292, 296 (D. Del. 2006). The Court is not persuaded that its previous reasoning with respect to this construction is erroneous, and the Court finds no support in the

specification for AUO's proposed construction of "joining" as a means of clarifying any ambiguity that may exist from the term "interconnecting." The Court also considered LGD's argument in the previous litigation that the Court's construction improperly limits the claim term to conductors; however, the Court noted that "the consistent use of a claim term by the inventor in the specification may serve to limit the scope of a claim." Id.

In addition, the Court is persuaded that LGD's construction reads out the term "substantially all" from the claim language by permitting "all." Accordingly, the Court concludes that "interconnecting substantially all of said row lines to one another and substantially all of said column lines to one another" means "electrically connecting with conductors nearly all, but not all, of said row lines to one another and nearly all, but not all, of said column lines to one another."

b. "resistance"

LGD contends that the term resistance should be defined as "a circuit component designed to provide opposition to electric current flowing through itself and to minimize current surge in the TFT array from electrostatic discharge." D.I. 376 at Exh. B-8. LGD contends that its construction is appropriate, because the specification indicates that resistance minimizes discharge current surge. LGD also contends that its construction is similar to the construction adopted by the Court in the Tatung

case, except that it offers further clarification by (1) replacing the term "resistance" in the construction with its plainly understood dictionary meaning, i.e. "the opposition offered by a body or substance to the passage through it of a steady electric current;" and (2) "clarif[ying] that the current surge must be minimized *in the TFT array*, to be consistent with the claims and specification." D.I. 384 at 10.

CMO contends that the term "resistance" should be defined consistently with the definition rendered by the Court in the Tatung case. Specifically, CMO contends that "resistance" means "a circuit component that has a specified resistance to the flow of electric current and is used to minimize the current surge from an electrostatic discharge." D.I. 376 at Exh. B-8.

In response, AUO contends that the proper construction of resistance is "a circuit component that has a specified ratio between voltage and the flow of electric current, and is used to minimize the current surge from electrostatic discharge." Id. AUO also contends that its construction is consistent with the Court's previous construction, except that the term "resistance" is replaced with the plain technical meaning of the term resistance from the IEEE Standard Dictionary of Electrical and Electronic Terms. AUO contends that LGD's construction eliminates the "specified" value of resistance that the Court incorporated into its prior construction.

In reply, LGD contends that AUO's construction seeks to limit the term "resistance" to a "resistor." LGD contends that this construction is not supported by the specification, and one skilled in the art would not understand the term "resistance" to be limited to a resistor. D.I. 430 at 4.

In the Tatung action, the Court specifically rejected a construction which would "limit 'resistance' to one specific electric component, a resistor." 434 F. Supp. 2d at 298. In so doing, the Court noted that the term "resistance" is used in the claims in a manner somewhat different from its ordinary meaning to one of skill in the art. Id. at 299. Specifically, the Court stated that "[i]n the claims, the term 'resistance' is used consistently to denote only a circuit component used to couple the outer ESD guard ring to the interconnected row and column lines and the pickup pad." Id. (citations omitted). With this understanding, the Court will not depart from its previous construction or rationale, and will define "resistance" as "a circuit component that has a specified resistance to the flow of electric current and is used to minimize the current surge from an electrostatic discharge."

c. "removing said outer guard ring and row and column interconnections"

LGD contends that the phrase "removing said outer guard ring and row and column interconnections" should be construed consistently with the definition provided by the Court in the

Tatung litigation. Specifically, LGD contends that the "outer electrostatic discharge guard ring" should be defined as "a closed or open ring, or open L or C-shaped line, outside the active matrix display to provide protection from electrostatic discharge" and "removing said outer guard ring and row and column intersections" should be defined as "physically disconnecting said guard ring and row and column interconnections." D.I. 376 at Exh. B-7 & B-10. CMO agrees with these constructions. Id.

AUO contends that this entire limitation is indefinite and that the patent fails to clearly teach the removing step. AUO contends that LGD's construction rests on an erroneous agreement between LGD and the previous defendant in the prior litigation. Alternatively, AUO contends that this phrase "removing said outer guard ring and row and column interconnections" should be construed as "physically disconnecting said guard rings and lines connecting/joining the row and column, intersecting pixel activation lines from the substrate." Id. at B-10. AUO also contends that the "outer electrostatic discharge guard ring" should be construed as "a surrounding structure outside the active matrix display to provide protection from electrostatic discharges." Id. at Exh B-7.

The Court has reviewed the parties' arguments in light of the specification of the '002 patent and is not persuaded that it should depart from its previous claim construction for this term

or the supporting rationale provided by the Court for that construction. 434 F. Supp. 2d 296-298. Accordingly, the Court concludes that the "outer electrostatic discharge guard ring" means "a closed or open ring, or open L or C-shaped line, outside the active matrix display to provide protection from electrostatic discharge" and "removing said outer guard ring and row and column intersections" means "physically disconnecting said guard ring and row and column interconnections."

2. U.S. Patent No. 5,825,449 (the "'449 patent")

LGD asserts claims 10 and 11 of the '449 patent against AUO. Claim 10 and claim 11 are independent claims. In full, claims 10 and 11 provide:

10. A liquid crystal display device comprising:
 - a substrate;
 - a first conductive layer on said substrate including:
 - a gate electrode,
 - a gate pad, and
 - a source pad;
 - a gate insulating film on said surface of said substrate, a portion of said gate insulating film overlying said gate electrode;
 - a semiconductor layer on said portion of said gate insulating film;
 - an impurity-doped semiconductor layer on said semiconductor layer;
 - a source electrode and a drain electrode on said semiconductor layer;
 - a passivation layer overlying said source pad, said drain electrode, said gate pad, and said source

electrode;

a first contact hole provided through said passivation layer and said gate insulating film exposing said source pad;

a second contact hole provided through said passivation layer exposing said drain electrode;

a third contact hole provided through said passivation layer and said gate insulating film exposing said gate pad;

a fourth contact hole provided through said passivation layer exposing said source electrode;

a pixel electrode electrically connected with said drain electrode via said second contact hole; and

a transparent conductive layer electrically connecting said source pad with said source electrode via said first contact hole and said fourth contact hole.

11. A method of manufacturing a liquid crystal display device, comprising the steps of:

forming a first conductive layer on a substrate;

patterning said first conductive layer to form a gate electrode, a gate pad and a source pad;

forming an insulating film on said substrate including said patterned conductive layer;

forming a semiconductor layer on said insulating film;

forming an impurity-doped semiconductor layer on said semiconductor layer;

patterning said impurity-doped semiconductor layer and said semiconductor layer to form an active layer;

forming a second conductive layer overlying said substrate including said active layer;

patterning said second conductive layer to form source electrode and a drain electrode on said active

layer;

forming a passivation film overlying said substrate including said source pad, a portion of said drain electrode, said gate pad portion, and a portion of said source electrode;

selectively etching said passivation film and said insulating film to form a first contact hole exposing said source pad, a second contact hole exposing said portion of said drain electrode, a third contact hole exposing said gate pad portion, and a fourth contact hole exposing said portion of said source electrode;

patterning a pixel electrode electrically connected to said drain electrode via said second contact hole;

patterning a first transparent conductive layer electrically connected to said gate pad through said third contact hole; and

patterning second transparent conductive layer electrically connecting said source pad to said source electrode via said first and fourth contact holes.

The parties agree that one of ordinary skill in the art with respect to the '449 patent would be a person with at least a bachelor's degree in engineering or related science, and one or two years of experience in the semiconductor or flat panel industry. Trial Tr. 1523:4-13 (Schlam); D.I. 1425 at ¶ 1429.

a. **"layer" and "conductive layer"**

LGD contends that one of ordinary skill in the art would construe the term "layer" to mean "thickness of material," and the term "conductive layer" to mean "thickness of electrically conductive material." D.I. 376 at Exh. C-2. Although the specification of the '449 patent refers to the conductive layer

that forms the gate pads, gate electrode and source pad as being of the same material, LGD contends that this limitation should not be imported into the claims. According to LGD more than one material may constitute the conductive layer, and these materials are inseparable. Therefore, LGD maintains that the claims should not be limited to a single material.

AUO and CMO do not appear to dispute the construction of the term "layer," but instead focus on the term "conductive layer." AUO contends that "conductive layer" should be construed in accordance with its plain meaning. Id. CMO contends that a "conductive layer" means "[a] thickness of electrically conductive material that may include one or more patterned features, all of a single material." Id.

The Court has reviewed the parties' positions in light of the claim language and the specification of the '449 patent, and concludes that a single material limitation is not required. '449 patent, col. 3, ll. 44-49, col. 4, ll. 46-61. In discussing Fig. 2a, the patent explains that the "conductive layer is formed on a transparent glass substrate 1 and patterned to form a gate electrode 2, a storage capacitor electrode 2D, and a gate pad 2C, all of the same material." Id. at col. 3, ll. 44-46. However, the Court is not persuaded that the limitation of one embodiment should be imported into the claims. Accordingly, the Court concludes that a "layer" means "thickness of material," and a

"conductive layer" means "thickness of electrically conductive material."

b. **"gate electrode" and "source electrode"**

LGD contends that the term "gate electrode" means "a patterned, electrically conductive material that controls current flow through the channel between the source electrode and drain electrode." D.I. 376 at Exh. C-11. LGD further contends that the term "source electrode" means "a patterned, electrically conductive material formed over the source region. Current flows through the channel between the source electrode and the drain electrode under the control of the gate electrode." Id. at C-18.

CMO's construction of gate electrode is the same as LGD's proposed construction. Id. at C-11. CMO's construction of source electrode is slightly different because CMO advocates construing "a source electrode and a drain electrode" together. Thus, CMO's definition of "source electrode" adds elements relevant to the drain electrode. Specifically, CMO contends that a "source electrode" is a "patterned electrically conductive material formed over the source region and drain region, respectively of a transistor. Current flows through the channel between the source electrode and the drain electrode and the drain electrode of the transistor under control of the gate electrode of the transistor." Id. at C-18.

AUO's construction of the term "gate electrode" is also similar to LGD's construction, but varies in where the patterned electrically conductive material is formed. Specifically, AUO contends that a "gate electrode" is "a patterned electrically conductive material formed in the gate region. Current flows through the channel between the source electrode and the drain electrode under control of the gate electrode." Id. at C-11. With respect to the term "source electrode," AUO agrees with LGD's construction. Id. at C-18.

Reviewing the specification and the claim language, the Court concludes that LGD's proposed constructions are most consistent with the claim language and the specification. '449 patent, col. 1, ll. 22-38, 56-60; col. 2, ll. 37-44, 56-61; col. 3, ll. 44-49; col. 4, ll. 47-53; col. 4, l. 65 - col. 5, l. 1, col. 5, ll. 29-38, Figs. 1-3. CMO's construction of "gate electrode" adds the term "drain electrode," and the Court is not persuaded that these terms must be construed together as CMO contends. Accordingly, the Court concludes that "gate electrode" means "a patterned, electrically conductive material that controls current flow through the channel between the source electrode and drain electrode," and "source electrode" means "a patterned, electrically conductive material formed over the source region. Current flows through the channel between the source electrode and the drain electrode under the control of the

gate electrode."

c. **"source pad"**

LGD contends that the term "source pad" means "a portion of patterned, electrically conductive material that is provided near the periphery of the thin film transistor array to receive a data signal." D.I. 376 at Exh. C-13. LGD contends that the '449 patent discloses that the source pad receives signals *for* the driving circuit, but the source pad may extend past the point of contact with the data driving circuit. D.I. 1396 at ¶ 1445-1446.

The constructions of AUO and CMO are similar, except that AUO does not provide for "a portion," and both AUO and CMO require "the thin film transistor array to receive a data signal *from a data driving circuit.*" D.I. 376 at Exh. C-19. In this regard, CMO and AUO point out that the specification of the '449 patent makes it clear that the gate and source pads receive data *from* "gate drive and data driver respectively." '449 patent col. 1, ll. 27-30. AUO also contends that there is no intrinsic support to limit the gate/source pad to only "a portion."

The '449 patent was previously the subject of litigation in the Central District of California between LG Phillips LCD Co., LTD. and Tatung Co. of America, Tatung Company and Chunghwa Picture Tubes, Ltd. (the "California litigation"). In the California litigation, the court construed source pad consistently with the construction proffered by CMO. LG Phillips

LCD Co., Ltd. v. Tatung Co. of America, Civ. Act No. 02-6775-CBM (JTLx), at 17 (C.D. Cal. May 5, 2005). While the Court is not bound by this construction, the Court concludes that it is consistent with the specification which makes it clear that the data is received *from* the gate drive and data driver respectively. '449 patent, col. 1, ll. 27-30, 52-55; col. 1, l. 67 - col. 2, l. 4. Accordingly, the Court concludes that the term "source pad" means "a portion of patterned, electrically conductive material that is provided near the periphery of the thin film transistor array to receive a data signal from a data driving circuit."

d. **"on" and "formed on"**

LGD contends that the terms "on" and "formed on" mean "above and in contact with." D.I. 376 at C-3. The Court does not understand the parties to genuinely dispute this construction. D.I. 1425 at 236 ("Both LGD and AUO agree that the term 'formed on' as recited in the '449 patent requires at least "above and in contact with.>"). Accordingly, the Court construes the terms "on" and "formed on" to mean "above and in contact with."

e. **a source electrode and a drain electrode on a said semiconductor layer**

LGD contends that "a source electrode and a drain electrode on said semiconductor layer" means "a source electrode and a drain electrode above and in contact with the semiconductor layer." D.I. 376 at Exh. C-17.

AUO contends that there is ambiguity as to what layer is referred to as "said semiconductor layer" in the claim language. AUO contends that one of ordinary skill in the art would understand that the electrodes would need to be above and in contact with an impurity-doped semiconductor layer in order for the TFT to function. AUO contends that LGD's position ignores what is commonly understood as "above and in contact with," and ignores the construction of "source electrode," which requires that the conductive material be formed over the source region. D.I. 1429 at 13. Thus, AUO's proposed construction for the phrase "a source electrode and a drain electrode on said semiconductor layer" is "the source electrode and the drain electrode above, supported by, and in contact with the semiconductor layer." D.I. 376 at Exh. C-17. CMO's construction of this phrase is identical to LGD's proposed construction. Id.

The Court adopts the claim construction proposed by LGD and CMO. This construction is consistent with the Court's definition of the term "on," and with the plain claim language and the requirements of the specification. '449 patent, col. 1, ll. 40-51; col. 1, l. 61 - col. 2, l. 4; col. 2, ll. 37 - col. 3, l. 15; col. 3, l. 50 - col. 4, l. 5, col. 4, l. 65 - col. 5, l. 15, Figs. 1-3. Accordingly, the phrase "a source electrode and a drain electrode on said semiconductor layer" means "a source electrode and a drain electrode above and in contact with the

semiconductor layer."

3. U.S. Patent No. 6,815,321 (the "'321 patent")

LGD asserts claims 7, 17 and 19 of the '321 patent. Claim 7 is an independent claim. Claims 17 and 19 are dependent claims that stem from independent claim 16. In full, the asserted claims provide:

7. A method of forming a thin film transistor comprising:

forming a first metal layer on a substrate,

forming a second metal layer on the first metal layer;
simultaneously patterning the first and second metal layers to form a double-layered metal gate, so that a total width of the first metal layer is greater than a total width of the second metal layer by about 1 to 4 μm .

16. A method of making a thin-film transistor, comprising the steps of:

depositing a first metal layer on a substrate, the first metal layer including aluminum;

depositing a second metal layer on the first metal layer without forming a photoresist on the first metal layer beforehand;

forming a single photoresist having predetermined width on the second metal layer;

patterning the first and second metal layers simultaneously in a single etching step using the single photoresist as a mask, the first metal layer being etched to have a width greater than a width of the second metal layer by about 1 to 4 μm ; and removing the photoresist.

17. The method of making a thin film transistor as claimed in claim 16, further comprising the steps of:

forming a first insulating layer on the substrate including the gate;

forming a semiconductor layer and an ohmic contact layer on a portion of the first insulating layer at a location corresponding to the gate;

forming a source electrode and a drain electrode extending onto the first insulating layer on two sides of the ohmic contact layer, and removing a portion of the ohmic contact layer exposed between the source and the drain electrodes; and

forming a second insulating layer covering the semiconductor layer, the source electrode, the drain electrode and the first insulating layer.

19. The method of making a thin film transistor as claimed in claim 16, wherein the first metal layer has thickness of about 500 Å to about 4000 Å.

a. **"a total width" and "a width greater than"**

LGD contends that these limitations mean "the width of the first metal layer, determined by the portion of the first metal layer in contact with the second metal layer together with the portions exposed to the subsequently deposited gate insulating layer, is more than 1 μm and less than 4 μm greater than the width of the second metal layer." D.I. 367 at Exh. G-6. LGD goes on to clarify that one skilled in the art would understand that the way to determine the "width" of a metal layer of a TFT gate is to measure at the widest portion, meaning the bottom surface, of the layer.

In response, AUO contends that these terms are indefinite. Alternatively, AUO contends that the phrase "a total width of the

first metal layer is greater than a total width of the second metal layer by about 1 to 4 μm " means "the width of the first metal layer is about 1 to 4 μm greater than the width of the second metal layer when measured from a level defined by the top of the first metal layer." Id.

CMO contends that these phrases should be construed as:

The top surface of the first metal layer has a width that is about 1 to 4 μm wider than a width of the top surface of the second metal layer to form a double step. A double step is a structure where not all of the top surface of the first metal layer is covered by the second metal layer.

Id. CMO contends that its construction requires the widths to be measured along the top surfaces of the first and second metal layers. CMO contends that its construction is consistent with LGD's responses to an Office Action issued by the British Patent Office asking for clarification regarding the width measurements.

Examining the claim language in light of the specification and the testimony concerning the understanding of one of ordinary skill in the art, the Court concludes that the width terms are not indefinite and are properly defined as proposed by LGD, such that the width measurement is taken at the widest portion of the layer, which in the case of the '321 patent, is the bottom surface of the layer. While the figures of the '321 patent are not necessarily drawn to scale, and thus, create some ambiguity regarding the meaning of width as designated by "w1" and "w2," the Court is persuaded that any ambiguity is rectified by the

specification, which explains that the width of a metal layer of a TFT gate is defined according to the photoresist used to pattern the layer. '449 patent, col. 2, ll. 1-8, 12-20; col. 6, ll. 36-39. One of ordinary skill in the art would understand that, according to standard wet etching techniques, a metal layer structure that is patterned by use of a photoresist would not extend outside the cover of the photoresist, or stated another way, would not be wider than the photoresist. Tr. 352:7-354:5 (Rubloff). Dr. Howard also acknowledged that he had never seen a wet etching process that resulted in the metal layer being wider than the photoresist. Tr. 1161:12-15 (Howard). AUO's construction would conflict with this understanding.

Further, the Court notes that in describing the embodiment of the invention shown in Figures 4A through 4F, the specification defines the photoresist used to form the first metal layer of the gate as having the same width, "w1," as the first metal layer discussed in the background section of the patent, which further discusses the related art in the same terms. The '321 patent further states, "[w]hen etching the first metal layer 43 other than the portion of the layer 43 covered with the photoresist 47, the first metal layer 43 preferably has the same width w1 of the photoresist 47." '449 patent, col. 6, ll. 36-39. Because the metal layers in the preferred embodiments of the invention are etched and patterned with only one

photoresist, a second photoresist having a width, "w2," defining the width of the second metal layer is not used in the preferred embodiments. However, the '321 patent refers to the width of the second metal layer in the preferred embodiments using the same designation, "w2," used to describe the width of the second metal layer in the background section, which again defines the width of the second layer in terms of the width of the second photoresist. Id. at col. 2, ll. 1-20. Accordingly, the Court concludes that the width terms are defined as "the width of the first metal layer, determined by the portion of the first metal layer in contact with the second metal layer together with the portions exposed to the subsequently deposited gate insulating layer, is more than 1 μm and less than 4 μm greater than the width of the second metal layer."

b. "a double layered metal gate"

LGD contends that the term "a double layered metal gate" means "a patterned structure of an electrically conductive material that includes two sequentially deposited metal layers and includes a portion that controls current flow through the channel between the source electrode and drain electrode." D.I. 376 at Exh. G-4. According to LGD, the use of the term "includes" in the claim language and in its proposed construction is open-ended and permits the inclusion of additional features, such as additional layers, which LGD contends the specification

does not exclude.

AUO contends that this term means "a gate electrode having a two-layered step structure." D.I. 378 at 44; D.I. 376 at Exh. G-4. According to AUO, its construction is consistent with the specification because it captures the key features the inventors sought to claim with respect to the gate structure: (1) that it is composed of two layers, and (2) at the edges, the layers have a stepped structure with each other and with the substrate upon which they rest. AUO contends that the patentee's choice of the term "double-layered" denotes only two layers in a step structure.

CMO contends that this term means "a gate that has only two metal layers." Like AUO, CMO contends that the claim does not recite a structure with a triple layer or with a plurality of layers. CMO further contends that the patentee distinguished the claimed two layer gate from a three layered gate in the prior art, and therefore, a three-layered or multi-layered gate is not within the scope of the claims.

Reviewing the claim language in light of the specification, the Court concludes that "a double layered metal gate" means "a patterned structure of an electrically conductive material that includes two sequentially deposited metal layers and includes a portion that controls current flow through the channel between the source electrode and drain electrode." In reaching this

conclusion, the Court does not read the patent as precluding the possibility that additional layers could be added to the double layered gate. CMO cites to the patentee's statement in an office action distinguishing prior art to suggest that the patentee disavowed a double gate structure with additional layers, but the Court does not read the patentee's remarks in that manner. Rather, the patentee distinguished Miyago on other grounds and in so doing, recognized that Miyago starts with a double-layered gate:

Miyago does use an aluminum layer in a double-layered gate and does recognize a hillock problem which occurs along a top surface of a bottom aluminum layer located between the aluminum layer and a top layer. Miyago provides an entirely different solution by providing a clad structure for causing the top-surface hillock problem to be reduced. More specifically, Miyago teaches that in order to solve the top-surface hillock problem, a first tantalum layer is put on the Al-Mo double layer structure then a TaOx layer is put on the Ta layer.

JX F1 (Response dated November 17, 1998 at 3). Accordingly, the Court cannot find a clear disavowal of the possibility that additional layers can be added to the double gate structure. In addition, the Court does not find support in the specification or claim language for adding the "step structure" limitation proposed by AUO.

4. U.S. Patent No. 7,218, 374 (the "'374 patent")

LGD asserts claim 9 of the '374 patent. Claim 9 is a dependent claim that depends on claim 2, which in turn depends on

claim 1. Accordingly, the relevant claims of the '374 patent provide, in full:

1. A method of manufacturing a liquid crystal display (LCD) device comprising:

preparing a lower substrate and an upper substrate;

forming an auxiliary sealant and subsequently forming a main sealant on one of the lower and upper substrates, wherein the auxiliary sealant is formed in a dummy region and connects to the main sealant, and wherein the auxiliary sealant and the main sealant are contiguous;

applying a liquid crystal on one of the lower and upper substrates;

attaching the lower and upper substrates; and

curing at least the main sealant.

2. The method of claim 1, wherein the main sealant and the auxiliary sealant are at least partially curable by irradiating UV light and curing the main sealant includes irradiating UV light.

9. The method of claim 2, further comprising heating the sealant after irradiating the UV light

a. **main sealant**

LGD contends that "main sealant" means "sealant material that encloses the display region." D.I. 376 at Exh. I-3. LGD further contends that the term "encloses" means "to surround on all sides; to enclose or contain completely." D.I. 384 at 30; D.I. 430 at 16. Thus, according to LGD, the main sealant must

completely surround the liquid crystal in the display area, with no opening or fill points.

AUO contends that the term "main sealant" means "a segment of sealant for enclosing the liquid crystal in the LCD panel." D.I. 376 at Exh. I-3. CMO contends that the term "main sealant" means "sealant material necessary for confining liquid crystal from leaking out from between the substrates." Id.

The Court concludes that the term "main sealant" means "sealant material that encloses the display region" with the understanding that "encloses" means "to surround on all sides; to enclose or contain completely." In the Court's view, this construction is consistent with the specification and reduces the likelihood of ambiguity and confusion. '374 patent, col. 3, ll. 23-24 ("The main UV sealant acts as a sealant to confine the liquid crystal."), 37 (describing a "closed type main UV sealant"). AUO's construction, which permits multiple separate segments of sealant, is inconsistent with the specification and the purposes of the patent in that it reintroduces the problem of excess sealant and contamination that the claimed invention is designed to address. Id. at col. 5, ll. 5-7, 26-34; col. 2, ll. 62-67; Figs. 3B, 4A, 5A. In addition, the specification makes clear that the main sealant encloses the place where the liquid crystal must be deposited, meaning the display area. Id. at col. 5, ll. 31-32. Thus, the Court finds AUO's construction of

enclosing the liquid crystal to be imprecise.

Similarly, CMO's construction, while addressing the function of the main sealant, does not explain whether the sealant must fully enclose the display area and interjects confusion because it may refer to only a portion of the seal or include a subsequent "plug" seal after vacuum injection is used to fill an injection hole. Such plugged holes are not contemplated in the '324 patent, which discloses a main sealant formed as a closed loop completely surrounding the display area with no injection fill ports or other openings. Id. at col. 2, ll. 38-40.

b. "auxiliary sealant"

LGD contends that the term "auxiliary sealant" means "sealant deposited in an area outside of the main sealant." D.I. 376 at Exh. I-3.

AUO's proposed construction is slightly different in that AUO contends that the term "auxiliary sealant" means "a segment of sealant that extends from the main sealant and is outside the enclosure of the main sealant." Id. Like its construction for "main sealant," CMO's construction for auxiliary sealant focuses on the functional aspect of the auxiliary sealant. Specifically, CMO defines "auxiliary sealant" as "sealant material that is not necessary for confining liquid crystal from leaking out between the substrates."

After reviewing the specification in light of the parties' arguments, the Court concludes that "auxiliary sealant" means "sealant deposited in an area outside of the main sealant." As LGD points out, AUO's construction improperly suggests that the main sealant is formed prior to the auxiliary sealant, which is contrary to the teachings of the specification which indicate that the auxiliary sealant is formed first. '374 patent, col. 3, ll. 13-15 (" . . . forming an auxiliary sealant and subsequently forming a main sealant on one of the lower and upper substrates . . .") (emphasis added). In addition, CMO's construction for the term "auxiliary sealant" fails for the same reasons discussed with respect to its proposed construction of "main sealant."

II. Direct Infringement

A. Applicable Law

A patent is infringed when a person "without authority makes, uses or sells any patented invention, within the United States during the term of the patent" 35 U.S.C. § 271(a). A patent owner may prove infringement under either of two theories: literal infringement or the doctrine of equivalents. Literal infringement occurs where each element of at least one claim of the patent is found in the alleged infringer's product. Panduit Corp. v. Dennison Mfg. Co., 836 F.2d 1329, 1330 n. 1 (Fed. Cir. 1987); Robert L. Harmon, Patents and the Federal

Circuit 195 & n. 31 (3d ed. 1994).

"The doctrine of equivalents allows the patentee to claim those insubstantial alterations that were not captured in drafting the original patent claim but which could be created through trivial changes." Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 733 (U.S. 2002). "An element in the accused device is equivalent to a claim limitation if the only differences between the two are insubstantial." Honeywell Int'l v. Hamilton Sundstrand Corp., 370 F.3d 1131, 1139 (Fed. Cir. 2004). To prove infringement by the doctrine of equivalents, a patentee must provide "particularized testimony and linking argument" as to the "insubstantiality of the differences" between the claimed invention and the accused product, or with respect to the function/way/result test. See Texas Instruments Inc. v. Cypress Semiconductor Corp., 90 F.3d 1558, 1567 (Fed. Cir. 1996). "[E]vidence and argument on the doctrine of equivalents cannot merely be subsumed in plaintiff's case of literal infringement." Lear Siegler, Inc. v. Sealy Mattress Co., 873 F.2d 1422, 1425 (Fed. Cir. 1989).

Infringement is a two step inquiry. Step one requires a court to construe the disputed terms of the patent at issue. Construction of the claims is a question of law subject to de novo review. See Cybor Corp. v. FAS Techs., 138 F.3d 1448, 1454 (Fed. Cir. 1998). Step two requires the fact-finder to compare

the accused products with the properly construed claims of the patent. This second step is a question of fact. See Bai v. L & L Wings, Inc., 160 F.3d 1350, 1353 (Fed. Cir. 1998). The party asserting infringement under either the theory of literal infringement or the doctrine of equivalents has the burden of proof and must meet its burden by a preponderance of the evidence. SmithKline Diagnostics, Inc. v. Helena Lab. Corp., 859 F.2d 878, 889 (Fed. Cir. 1988) (citations omitted).

B. Whether AUO Infringes Claim 8 of LGD's '002 Patent

After comparing AUO's accused products with claim 8 of the '002 patent, the Court concludes that LGD has not established by a preponderance of the evidence that AUO infringes the '002 patent. In reaching this conclusion, the Court credits the testimony of Professor King Liu over the testimony of Dr. Schlam, and finds that the interconnecting, resistance and removing elements of the '002 patent are not met in the accused AUO products. In the representative products identified by LGD as the "shorting bar design" products, T420XW01 and B121EW03, only one-half of the row (gate) lines are connecting together via a shorting bar in these products. Tr. 1445:1-1447:1 (King Liu). In addition, only one-third or one-sixth of the column (source or data) lines are connecting together via the shorting bar in these products. Tr. 1447:2-1448:17 (King Liu). The Court concludes that these proportions do not meet the "substantially all"

requirement of the interconnecting element as defined by the Court.

As for the "diode design" products, the Court likewise concludes that LGD has not established that the accused products satisfy the interconnecting element as construed by the Court. First, Dr. Schlam testified that the claimed interconnected row and column lines are made through silicon channels in the diode pair. A silicon channel is a semiconductor and is normally an insulator and not a conductor. Tr. 1362:3-11 (King Liu). The Court has construed the interconnecting element as requiring "electrically connecting with conductors." Accordingly, the Court cannot conclude that LGD has established that the diode design products, which use semiconductors, satisfy this claim limitation.

In addition, the Court concludes that the "diode design" does not meet the "substantially all" requirement of the interconnecting element. As Professor King Liu credibly explained, there is no interconnection when the voltage applied to the diode is below the threshold voltage and acting like an open switch. Tr. 1461:21-1462:16 (King Liu). Only one or two lines at a time would ever be charged enough to apply a voltage above the threshold to activate and turn on one of the diodes in those lines. Tr. 1462:23-1463:9 (King Liu). With only one or two lines being interconnected at any given time, the Court

cannot conclude that "substantially all" of the lines are interconnected as required by this claim element.

With respect to the resistance element, the Court likewise concludes that LGD has not established by a preponderance of the evidence that either the accused shorting design products or the accused diode design products meet this element. With respect to the shorting bar design product identified by LGD, T420XW01, LGD's expert Dr. Schlam identified a serpentine pattern of ITO as the claimed "resistance to provide protection from electrostatic discharges between said row and column activation lines during manufacture of the displays." However, the Court credits Professor Liu's testimony that the serpentine pattern of ITO in the accused AUO products does not perform the recited function. As Professor King Liu explained, the serpentine pattern of ITO is formed at the end of the TFT manufacturing process and is part of the last layer formed on the TFT substrate, therefore "there's no way that a resistance implemented with the ITO layer could possibly provide for ESD protection during the majority of the display and manufacturing process." Tr. 1450:7-11 (King Liu).

LGD contends that Professor King Liu conceded that manufacturing steps occur after the formation of the ITO layer where static electricity, such as rubbing, can occur. However, Professor Liu further explained that at the same time the ITO resistor is formed, the inner guard ring is completed, and that

the inner guard ring provides the protection from electrostatic discharges and not the serpentine ITO pattern. Tr. 1450:12-19 (King Liu). Accordingly, the Court cannot conclude that AUO's shorting design products meet the resistance limitation.

Similarly, the Court is not persuaded that LGD has established that the "diode design" products meet the resistance limitation. A diode does not provide opposition to electric current flowing through it and is not intended to oppose or minimize the flow of current. Tr. 1464:7-16, 1465:14-17 (King Liu). Instead, a diode is designed to either allow no current to flow or to allow current to flow freely, depending on whether a voltage threshold is met. Tr. 1453:14-1454:4, 1457:5-8, 1462:9-11 (King Liu). Accordingly, the Court cannot conclude that the diode design products meet the resistance limitation.

As for the removing element, the Court concludes that LGD has not established by a preponderance of the evidence that the accused shorting design and diode design products meet this claim element. The Court's construction of this term requires "physically disconnecting said guard ring and row and column interconnections." As the Court explained in its previous claim construction decision, this requires physical disconnection such that the disconnected parts are not included in the finished products. Tatung, 434 F. Supp. 2d at 297 ("Thus, the intrinsic evidence indicates that 'removing' is used to mean physical

disconnection and separation such that the outer guard ring and row and column interconnections are not included in the finished display panel.") (emphasis added). However, the shorting bars, which LGD has identified as the row and column interconnections, are included in the finished display, and therefore, they cannot be physically disconnected as required by the Court's claim construction. Tr. 1465:18-1466:18, 1450:20-1451:14 (King Liu); AUO-1710 at 30-31; Murray Decl., Exh. B (Schlam Expert Report) at Exh. 23 (Fig. 10).

In the diode design products, LGD has identified the silicon channels in the diodes as the interconnections, however, the Court finds that these are also not removed from the finished display. Tr. 1465:18-1466:18 (King Liu); AUO 1710 at 36. Accordingly, the Court concludes that the diode design products do not meet the removing claim element.

In sum, the Court finds that LGD has not established by a preponderance of the evidence that each element of claim 8 is found in AUO's accused products. Accordingly, the Court concludes that LGD has not established that AUO infringes the '002 patent.

C. Whether AUO Infringes Claims 10 and 11 of LGD's '449 Patent

After comparing AUO's accused products with claims 10 and 11 of LGD's '449 patent, the Court concludes that LGD has not

established by a preponderance of the evidence that the accused AUO products infringe the '449 patent. In reaching this conclusion, the Court credits the testimony of Professor King Liu over the testimony of Dr. Schlam and finds that numerous claim elements are not satisfied in the accused AUO products. For example, both claims 10 and 11 of the '449 patent require a first conductive layer, which includes a source pad on the substrate. A source pad has been defined as "a portion of patterned, electrically conductive material that is provided near the periphery of the thin film transistor array to receive a data signal from a data driving circuit." In AUO's products, the driver circuits are attached via anisotropic conducting film ("ACF") to ITO material in the pad region. Tr. 1377:2-6 (King Liu). The ITO receives the data signal from the ACF, but the ITO material is not on the substrate. Tr. 1392:20-1393:11; 1395:18-1396:21; 1405:8-1406:13 (King Liu). In AUO's products the gate pad and source pad are formed from ITO, and the ITO material is above the passivation layer and is the upper-most conductive layer or the layer highest away from the substrate. Tr. 1393:7-11; 1396:2-4 (King Liu). Accordingly, the Court is not persuaded that AUO's products have a first conductive layer on the substrate that includes the source pads.

Claims 10 and 11 further require "a first contact hole provided through said passivation layer and said gate insulating

film exposing said source pad." In AUO's products, the source pads are formed of ITO and are not covered by a passivation layer and gate insulating film. Tr. 1396:2-4, 1392:20-1392:11, 1395:18-1396:22, 1405:8-1406:13 (King Liu). Accordingly, the Court cannot conclude that LGD has established that the accused AUO products infringe the '449 patent.

In addition, claim 10 requires a "source electrode and a drain electrode on said semiconductor layer." The parties agreed that the term "on" means "above and in contact with." Dr. Schlam testified that "said semiconductor layer" refers to the un-doped semiconductor layer. Tr. 672:14-673:1 (Schlam). In AUO's products, the source and drain electrodes are not simultaneously above and in contact with the un-doped semiconductor layer. Tr. 1424:4-17. Rather, the source and drain electrodes are above and in contact with the impurity-doped semiconductor layer. Tr. 1394:3-7. Thus, the Court cannot conclude that the accused products meet this claim limitation.

In sum, the Court concludes that LGD has not offered sufficient proof of infringement to meet its burden by a preponderance of the evidence. The Court acknowledges that many of the aforementioned issues present close questions, but the burden remains on LGD to prove infringement. Evidence that is weaker than or equally matched with the evidence presented by AUO cannot sustain this burden. Accordingly, the Court concludes

that LGD has not established that AUO infringes the '449 patent.

D. Whether AUO Infringes Claims 7, 17 and 19 of LGD's '321 Patent

After comparing AUO's accused products with the asserted claims of the '321 patent, the Court concludes that LGD has not established by a preponderance of the evidence that AUO infringes the '321 patent. In reaching this conclusion, the Court credits the testimony of Dr. Howard over Dr. Rubloff. In support of its infringement argument, LGD relies heavily on an AUO presentation entitled "M1 Reduction" that discloses taper angle measurements based on SEMs. LGD-155. However, this presentation does not disclose the measurements of any of AUO's commercial products and instead reflects an experimental change to AUO's process. Tr. 439:16-441:24 (Rubloff); Tr. 1175:14-18 (Howard). In addition, this presentation discloses a maximum taper angle of 50 degrees, which does not support infringement and reflects substantial variability in taper angle even with a single analyzed substrate. Tr. 432:1-433:8, 442:1-443:3 (Rubloff); Tr. 1091:2-7 (Howard); AUO-1309 at AUO-LGD 2822394.

As for the other evidence presented by LGD, which consists primarily of SEM images, the Court likewise concludes that it is insufficient to establish infringement by a preponderance of the evidence. In the Court's view, the evidence concerning the width measurements of the SEM images was equivocal at best, with Dr.

Rubloff measuring 1.1 microns, on the assumption that both sides of the gate were the same, and Dr. Howard measuring a width difference of .8 microns using the same photo, along with the horizontal scale provided on the image and relying on the yellow lines marking the edges of the layers as supplied on the image by Dr. Rubloff. Tr. 1114:9-1119:1 (Howard); AUO-1683 at 2, 3; AUO-1702 at 36-39. Indeed, even Dr. Rubloff recognized the legitimacy of the discrepancy, Tr. 462:13-14, and in the Court's view, Dr. Howard's testimony casts significant doubt on the accuracy of Dr. Rubloff's measurements. Tr. 1177:16-1178:9, 1179:20-1181:24, 1115:8-1119:1 (Howard). Further, the SEMs of AUO's products were not taken within the TFT and only show one side of the gate line. Tr. 1111:19-1112:8, 1119:2-1120:17, 1113:5-15 (Howard). While LGD assumed the gate would be symmetrical, this could not be independently verified, and one could not determine whether the cross-sections were taken at an angle. Both of these issues, a lack of symmetry and the angle of the cross-section, could inflate the width difference which is critical to the claims. Tr. 1112:18-1114:5, 1119:2-1120:17 (Howard).

In addition, Dr. Rubloff based his conclusions of infringement regarding unanalyzed products on the fabrication plants ("fabs"), not the accused products themselves. Tr. 405:14-23 (Rubloff); Tr. 1107:5-20 (Howard). The evidence shows

differences in the process parameters for the fabs, the equipment origins, the etchant concentrations and recipes, the thickness of the metal layers across the fabs and within the same fabs, and the manufacturing processes in the fabs. Tr. 1107:21-1108:23; 1093:9-1098:20; 1099:6-1100:3 (Howard); AUO 1702 at 33; 1089:9-1090:19; AUO-1304. Given the precise parameters of the measurements needed to satisfy the claims, the Court cannot conclude that these differences are insubstantial or without effect on the finished AUO products. Indeed, the testimony suggests that these differences in turn yield differences among the AUO products produced, and further suggests that one cannot expect consistency of taper angles from fab to fab. Tr. 1097:2-22 (Howard); AUO-1702 at 29; compare AUO-1318 at 15 (AUO-LGD 1676248) with AUO-1308 at AUO-LGD 1674750. In the Court's view, this evidence is fatal to LGD's attempt to establish that the claimed width element is present in the accused products.

In sum, the Court concludes that LGD has not demonstrated by a preponderance of the evidence that the elements of the asserted claims of the '321 patent are present in the accused AUO products. Accordingly, the Court concludes that LGD has not established that AUO infringes the '321 patent.

E. Whether AUO Infringes Claim 9 of LGD's '374 Patent

LGD's infringement argument related to the '374 patent is based upon the application of 35 U.S.C. § 295. In full, Section

295 provides:

Presumption: Product made by patented process

In actions alleging infringement of a process patent based on the importation, sale, offer for sale, or use of a product which is made from a process patented in the United States, if the court finds-

(1) that a substantial likelihood exists that the product was made by the patented process, and

(2) that the plaintiff has made a reasonable effort to determine the process actually used in the production of the product and was unable so to determine,

the product shall be presumed to have been so made, and the burden of establishing that the product was not made by the process shall be on the party asserting that it was not so made.

The Federal Circuit has described this statute as "a burden shifting mechanism." Nutrinova Nutrition Specialties and Food Ingredients GmbH v. Int'l Trade Com'n, 224 F.3d 1356, 1359 (Fed. Cir. 2000). When the requirements of the statute are met, the burden to establish infringement shifts from the patentee alleging infringement to the alleged infringer to disprove infringement. To trigger the burden shifting under Section 295, the patentee must show, by a preponderance of the evidence, that 1) a substantial likelihood exists that the product was made by the patented process, and 2) the plaintiff has made a reasonable effort to determine the process actually used in the production of the product and was unable so to determine. Id at 1359-1360.

With respect to the first requirement, the burden for establishing a substantial likelihood of infringement has been described as “less than . . . proving successfully at a trial by a fair preponderance of the evidence that a product in question was in fact made by the patented process but would be more than a slight possibility that the product was so made.” West v. Jewelry Innovations, Inc., No. C 07-1812 JF(HRL), 2009 WL 1010848 at *8 (N.D. Cal. Apr. 14, 2009) (quoting S. Rep. No. 100-83, at 45). Stated another way, the patentee “need only present evidence that would support a reasonable conclusion that the imported product was made by the patented process.” Id. at *9.

As for the second requirement, the patentee must show it engaged in reasonable efforts to determine the defendant’s actual process. In making this determination, courts examine the patentee’s discovery efforts and consider whether the patentee “followed all of the avenues of discovery likely to uncover the [defendant’s] process, including written discovery requests, facility inspections, first-hand observation of the process, independent testing of process samples, the use of experts, and depositions of [the defendant’s] officials.” Kemin Foods v. Pigmentos Vegetales Del Centro S.A. de C.V., No. 4:02-cv-40327, 2004 U.S. Dist. LEXIS 17206, at *29 (S.D. Iowa Aug. 27, 2004).

In this case, LGD lists several points, which it contends establish a reasonable likelihood that AUO’s accused ODF products

were made using the auxiliary sealant limitation of claim 9. Specifically, LGD contends that: (1) AUO practices ODF in at least nine of its fabs; (2) AUO's fabs use the majority of the steps required by the patent; (3) AUO only disputes the auxiliary sealant claim limitation; (4) AUO refused to produce the sealant pattern drawings during discovery; (5) the "start blob" problem is common to the LCD industry and cannot be corrected merely by adjusting the sealant-dispensing equipment; (6) auxiliary sealants are commonly used by other leading manufacturers in the field; and (7) AUO's expert witness, Mr. Tannas, did not deny that AUO possesses the requested sealant pattern. D.I. 1394 at 46-47. In addition, LGD contends that it made all reasonable efforts to determine the sealant dispensing processes used by AUO, including serving interrogatories and document requests, noticing and taking Rule 30(b)(6) depositions, sending letters to and having discussions with AUO's counsel and filing two motions to compel. D.I. 1433 at 23-25.

AUO disputes each of the seven points identified by LGD as triggering the Section 295 presumption and contends that they are inadequate to shift the burden of disproving infringement to AUO. AUO also contends that LGD did not use all reasonable efforts to determine AUO's sealant dispensing process. In this regard, AUO contends that LGD was able to learn about AUO's process through the deposition of Mr. Lin, reverse engineering samples of AUO

products, AUO's design review boards and videos taken during the sealant deposition process in AUO's fabs. AUO points out that the Court denied LGD's motions to compel, and therefore, AUO should not be penalized for any failures to produce the discovery sought by LGD. AUO also contends that LGD's expert only reviewed three sample products, despite AUO's offer to sell LGD hundreds of samples, and that of the three products reviewed, LGD's expert, Dr. Melnik reported that only one sample product showed an auxiliary sealant. D.I. 1392 at 42-50; D.I. 1429 at 20-21.

After reviewing the parties' arguments in light of the evidence adduced at trial, the Court concludes that LGD has not presented sufficient evidence to invoke Section 295 for purposes of shifting the burden of proof on infringement to AUO. In reaching this conclusion, the Court is not persuaded by the analysis and testimony of Dr. Melnik, which the Court finds to be speculative and insufficient to establish a reasonable likelihood of infringement. Although Dr. Melnik's expert report addresses claims 1 and 2, from which claim 9 depends, it never expressly lists or mentions claim 9. In addition, Dr. Melnik analyzed only three AUO sample products, and of these three products, only one product showed two out of three "indicators" of infringement. Tr. 506:5-13; 524:6-16; 526:18-20, 544:3-545:24 (Melnik); Tr. 1001:23-1002:10 (Tannas). Dr. Melnik testified at trial that he could not say definitely whether the product was made by an

infringing process, yet in his expert report he concluded that the product "shows an auxiliary sealant and infringes the '374 patent." Tr. 503:21-505:13, 507:4-11 (Melnik); Tr. 1001:2-9 (Tannas). Further, Dr. Melnik determined that the two other products he analyzed showed no indications of infringement, yet he never mentioned those products in his expert report as having been evaluated. Tr. 506:5-13; 524:6-16; 526:18-20 (Melnik); Tr. 1001:23-1002:10 (Tannas). Dr. Melnik also testified that the videos he used were inconclusive as to the studies he was making. Tr. 523:15-22. In addition, Dr. Melnik conceded that there is no infringement unless it can be said that AUO's trial witness, Mr. Lin, was untruthful during his testimony, and the Court cannot accept that suggestion after evaluating the testimony and demeanor of Mr. Lin, whom the Court found to be candid and forthright. Tr. 520:1-521:7, 521:17-22 (Melnik).

As LGD acknowledges, ODF is not unique to the '374 patent, and the Court cannot conclude that the fact that AUO uses an ODF method in its fabs is relevant to demonstrating a likelihood that AUO's accused ODF products were made using the claimed auxiliary sealant. Similarly, the fact that a "start blob" is a common problem in the industry and that other manufacturers' use auxiliary sealants to overcome that problem does not, in the Court's view, lead to a reasonable inference that AUO uses such an auxiliary sealant. Indeed, Mr. Tannas testified that AUO does

not use an auxiliary sealant and resolves the start blob problem in a different manner by controlling the syringe that deposits the sealant and by using a cloth to wipe clean the tip of the syringe. Tr. 981:23-982:6; 982:11-21; 987:1-9; 984:14-985:2; 994:17-23 (Tannas); Tr. 950:2-12 (Lin); AUO-1207-1211.

LGD also contends that AUO uses the same Hitachi or Top Engineering sealing dispensing equipment models as LGD; however, the Court is not persuaded by Dr. Melnik's testimony on this point. Dr. Melnik has no personal knowledge about the specific equipment in AUO's fabs and cannot opine as to whether they have the same features used by LGD in its process. As for LGD's arguments regarding lack of production by AUO, the Court notes that it did not require AUO to produce the documents sought, and there is no evidence that such documents actually existed for production.² Tr. 612:6-8; 613:21-614:2 (Chen).

The Court is also not persuaded by LGD's contention that it was unable to determine the process by which AUO manufacturers its LCDs. As Mr. Lin explained, each AUO product has its own DRB, Tr. 944:14-21 (Lin), and Mr. Tannas explained that the DRB's show the complete sealant pattern of the AUO products, including

² Indeed, it is the Court's view that much of Dr. Melnik's testimony is based upon suspicions regarding AUO's alleged lack of production. However, in light of the Court's ruling on LGD's motions to compel, the Court is not inclined to use Section 295 to punish AUO for a lack of production which was not ordered or required by the Court.

whether auxiliary sealants were used. Tr. 990:17-991:2 (Tannas); Tr. 950:2-12 (Lin). In the case of AUO's products, the evidence suggests that many of the signs indicative of the use of auxiliary sealant were absent, supporting AUO's position that its products do not use auxiliary sealants. Compare LGD-195 and AUO-1216; Tr. 537:17-538:21, 541:12-16 (Melnik); Tr. 999:7-14, 997:20-998:9; 994:17-995:2 (Tannas); AUO-1207; AUO-1209; AUO-1210; AUO-1703 at 19-22; AUO-1216; AUO-1217.

In sum, the Court is persuaded by the testimony of Mr. Lin and Mr. Tannas over the testimony of Dr. Melnik, and concludes that LGD has not established that Section 295 applies to shift the burden of disproving infringement to AUO. Further, the Court concludes that LGD has not established, by a preponderance of the evidence, the presence of the claimed auxiliary sealant in the AUO accused products as required by the '374 patent. As Mr. Tannas explained AUO utilizes other methods to control the "blob" problem, and the DRBs, which would show the presence of auxiliary sealants, show none. Tr. 950:2-12 (Lin); Tr. 990:17-20 (Tannas). The testimony of Mr. Tannas and Mr. Lin on this latter point is consistent with the video and still shots taken during the LCD manufacturing process in three of AUO's ODF fabs, and with the side-by-side comparison of disassembled sample products from AUO and LGD and Samsung, which show that the AUO product lacks the saddle shape that is characteristic of a device made using an

auxiliary sealant. Accordingly, the Court concludes that LGD has not established that AUO infringes the '374 patent.

III. Invalidity

A. Legal Principles

1. Obviousness

In pertinent part, 35 U.S.C. § 103 provides that a patent may not be obtained "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art." 35 U.S.C. § 103. Obviousness is a question of law that is predicated upon several factual inquiries. Richardson-Vicks v. Upjohn Co., 122 F.3d 1476, 1479 (Fed. Cir. 1997). Specifically, the trier of fact must consider four issues: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed subject matter and the prior art; and (4) secondary considerations of nonobviousness, such as commercial success, long felt but unsolved need, failure of others, and acquiescence of others in the industry that the patent is valid, and unexpected results. Graham v. John Deere Co., 383 U.S. 1, 17-18, (1966) (the "Graham factors"). The Supreme Court, in KSR Intern. Co. v. Teleflex Inc., 550 U.S. 398 (2007), reaffirmed that the Graham factors "continue to define the inquiry that controls" an obviousness analysis.

Because an issued patent is presumed valid, the party seeking to challenge the validity of a patent based on obviousness must demonstrate by clear and convincing evidence that the invention described in the patent would have been obvious to a person of ordinary skill in the art at the time the invention was made. Pfizer, Inc. v. Apotex, Inc., 480 F.3d 1348, 1359-60 (Fed. Cir. 2007). Clear and convincing evidence is evidence that places in the fact finder "an abiding conviction that the truth of [the] factual contentions are 'highly probable.'" Colorado v. New Mexico, 467 U.S. 310, 316 (1984).

2. Anticipation

A patent claim is anticipated if (1) "the invention . . . was patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for the patent", 35 U.S.C. § 102(a); or (2) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, 35 U.S.C. § 102(b); or (3) the invention was described in . . . an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent," 35 U.S.C. § 102(e).

Anticipation requires that "each and every element as set forth in the claim is found, either expressly or inherently

described, in a single prior art reference." Verdegaal Bros., Inc. v. Union Oil Co., 814 F.2d 628, 631 (Fed. Cir. 1987).

Because an issued patent is presumed to be valid, 35 U.S.C. § 282 (2000), the party asserting that a patent is invalid as anticipated must establish invalidity by clear and convincing evidence. WMS Gaming Inc. v. Int'l Game Tech., 184 F.3d 1339 (Fed. Cir. 1999). The burden of establishing anticipation is "especially difficult" if the accused infringer attempts to rely on prior art that was before the patent examiner during prosecution. Glaxo Group Ltd. v. Apotex, Inc., 376 F.3d 1339, 1348 (Fed. Cir. 2004).

B. Whether LGD's '002 Patent Is Invalid As Obvious

AUO contends that the '002 patent is invalid as obvious in light of Japanese patent application Sho 63[1988]-106788 (the "Kawamura reference") published on May 11, 1988. AUO contends that LGD cannot swear behind the Kawamura reference, because the documents upon which it seeks to rely were excluded by the Court in response to AUO's motion in limine, and an unwitnessed notebook cannot establish an earlier invention date. AUO contends that Kawamura teaches many of the limitations of Claims 1 and 8 of the '002 patent, and that LGD's arguments to the contrary are insufficient to distinguish the claims.

In response, LGD contends that the Kawamura reference is not prior art because it post-dates the inventors' conception and

reduction to practice of the invention in claim 8. In addition, LGD contends that Kawamura does not teach every limitation of the claimed invention, and AUO has not demonstrated that one skilled in the art would have combined the teachings disclosed in Kawamura.

The Court concludes that Kawamura qualifies as prior art to the '002 patent, because Kawamura was published prior to the application date of the '002 patent, and LGD has not established that the '002 was conceived or reduced to practice prior to the publication date of Kawamura. AUO-1176; AUO-1180; Tr. 1468:6-10 (King Liu). However, the Court cannot conclude that AUO has established by clear and convincing evidence that Kawamura invalidates the '002 patent as obvious. In the Court's view, Kawamura does not teach the use of both inner and outer guard rings as required by the '002 patent, does not disclose a removable inner guard ring and does not teach or suggest the adding of a resistance using a long serpentine pattern of conductive material. See e.g., AUOTX 1176 at AUO-LGD 3385622 (Fig. 3); LGDTX 1172 at 3; Tr. 1522:13-1524:7 (Schlam). The Court is further not persuaded that the evidence presented by AUO to the contrary rises to the level of the clear and convincing evidence needed to establish that the differences between the prior art and the claimed invention are such that the claimed invention would have been obvious to a person having ordinary

skill in the art. Accordingly, the Court concludes that AUO has not established invalidity of the '002 patent based on obviousness.

B. Whether LGD's '449 Patent Is Invalid As Anticipated And/Or Obvious

AUO contends that the '449 patent is invalid as obvious in light of the Fulks reference. The parties agree that Fulks discloses a 5-mask process, and AUO contends that Fulks discloses each of the limitations of claims 10 and 11 either explicitly or inherently.

In response, LGD contends that AUO's arguments regarding invalidity are inconsistent with the arguments it made in connection with infringement. LGD contends that Fulks does not meet the claim element disclosing "a source and drain electrode on said semiconductor layer," because it provides for a source and drain on the impurity doped layer. LGD also contends that Fulks fails to disclose "a first conductive layer . . . [including] a source pad" and "electrically connecting said source pad [with] said source electrode . . ." as required by claims 10 and 11.

After reviewing the parties' arguments in light of the evidence adduced at trial, the Court concludes that AUO has not established, by clear and convincing evidence, that the '449 patent is anticipated and/or obvious in light of the Fulks reference. In Fulks, the source and drain electrodes are

separated from the semiconductor layer, and thus, the source and drain electrodes are not above and in contact with the semiconductor layer as required by claim 10. Tr. 1527:3-1529:24; LGDTX 1172 at 6; AUOTX1152 at AUO-LGD 1322158, col. 3, ll. 47-55; AUO-LGD 1322154 (Figs. 3A-3E, items 62 and 562). Further, Fulks discloses that the impurity-doped semiconductor layer and the semiconductor layer are patterned at the same time as the source and drain electrodes, and therefore, the Court cannot conclude that Fulks discloses "forming a second conductive layer overlying said substrate including said active layer" as required by claim 11. Accordingly, the Court concludes that AUO has not established that Fulks invalidates the '449 patent.

C. Whether LGD's '321 Patent Is Invalid As Anticipated And/Or Obvious

AUO contends that the '321 patent is invalid as under 35 U.S.C. §112, ¶ 2, because it (1) fails to explain how to measure the claimed width differences, and (2) fails to provide a written description for a method of forming the two-layer metal gate that does not have the double step configuration shown in the patent figures. In addition to its Section 112 arguments which were rejected by the Court in the context of its claim construction, AUO also contends that the '321 patent is anticipated by the Seiki reference and the Kakuda reference, and anticipated and/or obvious in light of the Nakamura reference.

1. Anticipation in light of Seiki

AUO contends that the Seiki reference meets each and every limitation of claims 7, 17 and 19 under LGD's claim construction as adopted by the Court, which measures width using a bottom to bottom measurement. AUO further contends that LGD's only rebuttal evidence is Dr. Rubloff's opinion, which was undisclosed in his expert report and based on an incorrect claim construction.

In response, LGD contends that Seiki discloses a three layer metal gate, including a cladding structure that does not expose the sides of the first metal layer, as required by the '321 invention. LGD contends that Seiki teaches away from exposing the side of the first conductive layer as required by the claimed invention and does not disclose the limitation "forming a first insulating layer on the substrate including the gate" as recited in claim 17.

After reviewing the parties' arguments in light of the evidence adduced at trial, the Court concludes that AUO has not established, by clear and convincing evidence, that the '321 patent is anticipated by Seiki. AUO's expert Dr. Howard acknowledged that under LGD's claim construction, the exposed portions of the first metal layer must be in contact with a gate insulating layer. Tr. 1188:1-7 (Howard). In Seiki, the gate insulating layer 121 is actually formed on the second conductive

layer 115, which is the encapsulation layer. Seiki '835 at col. 7, 1.62 - col. 8, 1.9. Dr. Howard further acknowledged that under LGD's claim construction, which the Court has adopted, Seiki does not anticipate the '321 patent. Tr. 1188:8-15 (Howard). Accordingly, the Court concludes that AUO has not established that the Seiki reference invalidates the '321 patent.

2. Anticipation and/or obviousness in light of Nakamura

With respect to the Nakamura reference, AUO contends that the asserted claims of the '321 patent are invalid and/or anticipated. In particular, AUO contends that Nakamura satisfies the width limitations of the '321 patent based on a taper angle of 30 degrees and a thickness of 300 nm. AUO contends that Dr. Rubloff's testimony that Nakamura only discloses thickness of 150 to 250 nm is insufficient to rebut Dr. Howard's testimony on thickness.

In response, LGD contends that Nakamura does not disclose the claimed thicknesses and does not disclose the double step structure because the layers would have the same slope. LGD contends that the one skilled in the art would not increase the thickness of Nakamura because this could cause step coverage issues. LGD also contends that Nakamura does not prevent hillock on the sides of the exposed first metal layer. According to LGD, Nakamura describes a number of embodiments that actually teach away from the claimed invention.

After reviewing the parties' arguments in light of the evidence adduced at trial, the Court likewise concludes that AUO has not established anticipation and/or obviousness by clear and convincing evidence. The Court is not persuaded that Nakamura discloses the claimed thickness, and the Court is also not persuaded that the thickness is a design choice or that it would be obvious to one skilled in the art to increase the thickness disclosed in Nakamura by 20%, which might cause or exacerbate the step coverage problems for the gate insulating layer that the '321 patent attempts to resolve. Tr. 1538:7-1539:18 (Rubloff); AUOTX 1333 at AUO-LGD 3385649. In particular, the Court cannot conclude that Dr. Howard's testimony that one could randomly move from 250 to 300 nm rises to the level of clear and convincing evidence of obviousness. Tr. 1144:2-13 (Howard). Accordingly, the Court concludes that AUO has not established that the Nakamura reference invalidates the '321 patent.

3. Anticipation in light of the Kakuda reference

AUO contends that the '321 patent is invalid as anticipated by the Kakuda reference. According to AUO, Figure 8 of Kakuda discloses a TFT structure with a tapered double layer metal gate structure formed by simultaneous etching. AUO contends that Kakuda discloses the claimed width difference and that Figure 8 viewed in conjunction with the written description reveals that the 50 degree taper angle applies to the aluminum layer, and not

to the top molybdenum layer, as Dr. Rubloff opined.

In response, LGD maintains that the 50 degree taper angle relates to the molybdenum layer and not to the relevant aluminum layer. Thus, LGD maintains that Kakuda does not teach the claimed width difference of 1 to 4 μm , and discloses a bottom aluminum thickness and taper angles that are outside the range covered by claim 19.

Reviewing the parties' arguments in light of the evidence adduced at trial, the Court cannot conclude that AUO has established, by clear and convincing evidence, that the '321 patent is anticipated by the Kakuda reference. Notably, Kakuda does not mention anything regarding the width difference claimed in the '321 patent. AUO contends that Kakuda discloses the claimed width difference because it teaches etching a 1 μm bottom aluminum layer to have a side taper angle of 50 degrees. In particular, AUO relies on language in the patent concerning experiment II that states that "the side wall of the pattern has an inclination of approximately 40 degrees" AUOTX 1332 at col. 10, ll. 36-54. As LGD points out, however, this excerpt does not define what pattern has an inclination of 50 degrees. In the context of the patent as a whole and the other listed experiments, it appears to the Court that the 50 degree taper angle may, as LGD contends, pertain to the molybdenum layer, but at a minimum, there is ambiguity in the Kakuda reference. LGDTX

1171 at 8-9; Tr. 1539:19-1540:18 (Rubloff); AUOTX 1332 at col. 12, ll. 6-19. In the Court's view, this type of ambiguous evidence cannot rise to the level of the clear and convincing evidence required to establish anticipation. Accordingly, the Court concludes that AUO has not demonstrated that the '321 patent is invalid in light of Kakuda.

D. Whether LGD's '374 Patent Is Invalid As Anticipated And/Or Obvious

AUO advances two arguments concerning the validity of the '374 patent. First, AUO contends LGD's '374 patent is anticipated by Japanese Patent Application No. 2001-264782 (the "the Oshima reference"). Second, AUO contends that LGD's 374 patent is obvious in light of either Tashiro or Shinesenji in view of Kawabe.

1. Anticipation in light of Oshima

AUO contends that the Oshima reference is prior art to the '374 patent and that it discloses a dropping method to fill liquid crystal between flat panel substrates. AUO contends that Oshima discloses each element of the claimed invention inherently or expressly including: the preparation of a lower and upper substrate, the formation of an auxiliary sealant followed by a main sealant on one of the lower and upper substrates, an auxiliary sealant formed in a dummy region that connects to the main sealant in a contiguous pattern, the dropping of liquid crystal to one substrate before the two substrates are attached

to each other, attaching the two substrates to each other after the liquid crystal is dropped to one substrate, and curing the main sealant by UV irradiation and heat.

In response, LGD contends that Oshima was disclosed to the PTO during the prosecution of the '374 patent. LGD contends that Oshima does not disclose an ODF blob problem or propose any solutions to such a problem. Rather, LGD contends that Oshima discloses a "hybrid ODF-injection" process, which combines features of injection and liquid crystal dropping. According to LGD, Oshima uses an injection sealant pattern and teaches that liquid crystal is injected through the fill port after the substrates have been assembled and the sealant cured. LGD contends that Oshima does not disclose a "main sealant" as required by the '374 patent, because the seal referred to in Oshima does not enclose or completely surround the liquid crystal display area until the sealant has been cured, the liquid crystal injected and the fill port plugged. LGD further contends that Oshima does not inherently or expressly disclose an "auxiliary sealant" as required by the '374 patent. In this regard, LGD maintains that the fill port "legs," which AUO contends are the auxiliary sealant, become part of the main sealant in Oshima, and thus, they cannot be considered an auxiliary sealant.

After comparing the claims, as construed by the Court, to the Oshima prior art reference, and considering the arguments of

the parties, the Court cannot conclude that AUO has established that the '374 patent is invalid by clear and convincing evidence. The Court is not persuaded that Oshima discloses a "main sealant" as construed by the Court. In particular, Oshima discloses an injection pattern, which includes a fill port, or opening, through which liquid crystal is later injected into the display area. AUOTX 1221 at AUO-LGD 335864 (Fig. 1(a, b)). This is contrary to the closed main sealant disclosed in the specification and construed by the Court. '374 patent at col. 2, ll. 34-40; col. 5, ll. 3-6. In addition, the Court is not persuaded that Oshima discloses an "auxiliary sealant" as that term has been defined by the Court. AUO's expert, Mr. Tannas, identified the legs on either side of the fill port as the "auxiliary sealant" in Oshima. Tr. 1007:6-1008:21 (discussing AUOTX 1703 at 28). However, when the port fill in Oshima is plugged after injection, the port fill legs are not outside of the main sealant as required by the specification of the '374 patent and Court's claim construction of auxiliary sealant. Tr. 1561:10-24, 1563:6-21 (Melnik) (discussing LGDTX 1170 at 7). Instead, the port fill legs become part of the main sealant confining and surrounding the liquid crystal material in the display region. Further, the Court is not persuaded that Oshima discloses the steps for preparing those substrates for assembly as required by the '374 patent. '374 patent at col. 4, ll. 30-

67. Accordingly, while AUO's evidence of invalidity is not insubstantial, the Court cannot conclude, in light of its claim construction, the specification of the '374 patent, and the fact that Oshima was before the examiners during prosecution of the '374 patent, that the evidence rises to the level of the clear and convincing evidence required to establish that the '374 patent is invalid.

2. Obviousness in light of Kawabe with Tashiro or Shinesenji

In the alternative, AUO contends that the '374 patent is obvious in light of Kawabe in combination with either Tashiro or Shinesenji. AUO contends that Kawabe teaches that an auxiliary sealant can manage the start blob problem, and thus there is an express teaching to combine Kawabe with Tashiro or Shinesenji.

In response, LGD contends that Kawabe does not teach an "auxiliary sealant application technique" and makes no mention of ODF. LGD further points out that Kawabe is directed to a plasma display panel ("PDP") and describes no embodiments applicable to LCDs, which are mentioned only in passing. According to LGD, Kawabe teaches away from the concept of using auxiliary sealants to address the start blob problem, because it teaches that any glass paste hanging from the end of a dispensing nozzle should be "sucked back" into the needle by reversing the pressure. Kawabe also teaches finely tapering the sealant ends, which is a design that LGD contends cannot be accomplished using LCD/ODF sealants.

Given these differences and the substantial differences between LCD and PDP technology, LGD contends that it would not have been obvious to a person skilled in the art to combine Kawabe with the basic ODF processes described in Tashiro or Shinesenji.

After reviewing the parties' arguments and the evidence adduced at trial in light of the scope and content of the prior art, the level of skill in the art, and the differences between the prior art and the claimed invention, the Court is not persuaded that AUO has established by clear and convincing evidence that the '374 patent is obvious. In reaching this conclusion, the Court acknowledges similarities between the prior art and the '374 patent. In particular, the Court cannot find, as LGD urges, that Kawabe does not address LCD technology and does not mention the start blob problem. In fact, while Kawabe and its embodiments are targeted to PDP technology, Kawabe expressly suggests that, at least some of its techniques may be applicable to LCD technology. AUOTX 1222 at col. 10, ll. 35-40 ("Moreover, each embodiment of the invention is applicable for use as a liquid crystal panel as well as a PDP or any other type of flat display panel, with regard to the sealing of the opposed pair of substrates together so as to achieve the benefits of the invention."); col. 1, ll. 7-13 ("The present invention relates to a method of manufacturing a flat display panel and the resulting flat display panel, such as a plasma display or a liquid crystal

panel . . ."). In addition, Kawabe recognizes a problem with the thickness of the sealant, particularly in its starting position. See e.g., id. at col. 3, ll. 16-19 ("Alternatively, if the sealing material 33' projects from the end part of the nozzle as shown in FIG. 8(c), an excessive amount of material is deposited at the coating start position."). What the Court finds to be missing from Kawabe which is fatal to AUO's obviousness argument, however, is the teaching of an auxiliary sealant to solve the thickness or blob problem. The Court does not read Kawabe as referring to any second or auxiliary sealant. Rather, the Court is persuaded that Kawabe teaches away from the use of an auxiliary sealant to address the start blob problem by suggesting that any excess glass paste hanging from the end of the dispensing nozzle can be removed or minimized by reversing pressure in the nozzle to "suck back" the sealant. AUOTX 1222 at col. 2, l. 65 - col. 3, l. 8; col. 7, ll. 1-7, FIG. 8(c). In addition, Kawabe teaches away from a start blob problem by teaching narrowly tapered ends of the sealant, which are achieved by carefully controlling the flow of glass paste from the dispensing nozzle. Id. at col. 6, l. 41 - col. 7, l. 7; Tr. 1564:23-1567:14 (Melnik). No start blobs are disclosed with this technique of narrow tapering, and the narrow tapering is meant to

ensure uniform thickness of the glass paste in the overlap area.³ Id. at col. 4, l. 41 - col.5, l. 24, col. 9, ll. 6-39, col. 3, ll. 20-27, col. 9, ll. 6-35. Accordingly, while AUO's evidence is not unpersuasive, the Court cannot conclude that it rises to the level of the clear and convincing evidence required to establish invalidity, particularly where, as here, the Court finds the prior art to be lacking any reference or suggestion related to the key aspect of the claimed invention.

CONCLUSION

For the reasons discussed, the Court has defined the disputed terms in the asserted patents as set forth in this Opinion. In addition, the Court concludes that LGD has not established by a preponderance of the evidence that AUO infringes the patents asserted by LGD in this action, and that AUO has not established by clear and convincing evidence that the asserted patents are invalid.

The Court will withhold entry of a Final Judgment Order until the damages opinion is entered.

³ Further, while Kawabe suggests its applicability to LCDs, it is clear that LCDs do not use glass paste sealant, and it is, at a minimum, unclear as to whether the tapered ends taught in Kawabe could be applied in ODF circumstances. AUO has not rebutted LGD's evidence that tapered ends cannot be achieved in such circumstances, and in the Court's view, this is further evidence that one skilled in the art would not have looked to Kawabe for a solution to the problems raised in the '374 patent and would not have had the motivation to combine Kawabe with the prior art concerning basic ODF technology such as Tashiro or Shinesenji.